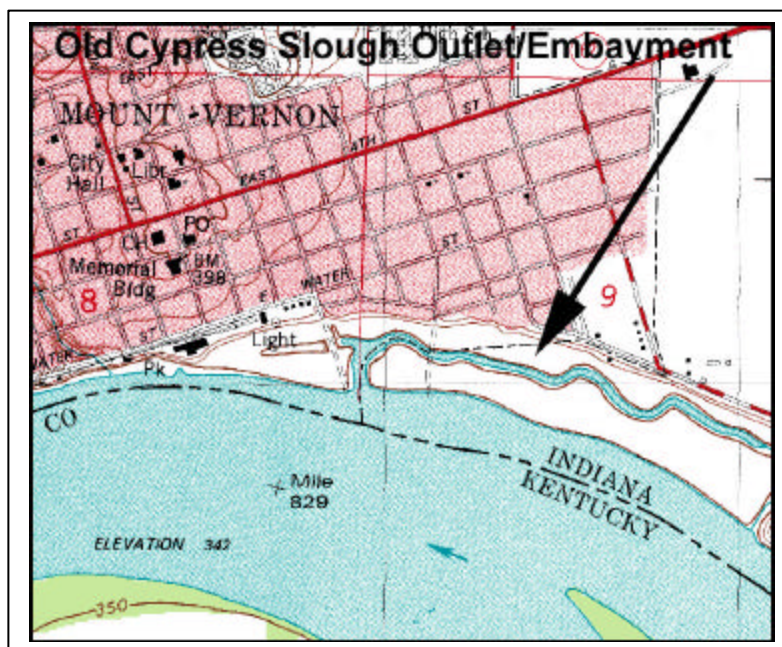


OLD CYPRESS SLOUGH OUTLET/EMBAYMENT (IN-14)

1.0 Location

The proposed Old Cypress Slough Outlet/Embayment Restoration project is located in Posey County, Indiana along the southeastern edge of Mt. Vernon, Indiana. The project area is near the Ohio River Meyer's Pool at river mile 828.9. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).



2.0 Project Goal, Description, and Rationale

The primary goals of the Old Cypress Slough Outlet/Embayment Restoration project include restoration of the existing embayment to enhance fish and wildlife habitat. The restoration of backwater areas will provide reproductive, feeding, nursery, high water refuge, seasonal migration, and overwintering habitat for many fish species. The project involves dredging 50% of the surface area to an average depth of 12 feet at the USACE normal pool level.

Ohio River embayments have historically provided important and diverse off-channel habitat for many fish species. Over the years many of the embayments have silted in and no longer maintain the quality or diversity of habitat previously provided.

Old Cypress Embayment is the remnant of the original Cypress Creek connection with the Ohio River. The embayment has no permanent connection to the original Cypress Creek channel.

The restoration of Old Cypress Slough Outlet/Embayment will result in improved off channel habitat within the Myers Pool of the Ohio River.



Old Cypress Aerial View

3.0 Existing Conditions

Old Cypress Embayment is the remnant of the original Cypress Creek connection with the Ohio River. The embayment has no permanent connection to the original Cypress Creek channel. The watershed for the embayment is very small. Water volume within the embayment is influenced by the extent and duration of high river stages within the J. T. Myers Pool of the Ohio River.

Terrestrial/Riparian Habitat: Habitat along Old Cypress Embayment reflects the urban nature of the area. A narrow band of riparian woodlands comprised mostly of silver maple (*Acer saccharinum*) is present along the embayment. The area contains trash and woody debris deposited in the area during periods of high river stages.

The Village of Mount Vernon is adjacent to the north and west of the project area. East of the project site is a disturbed area that may have served as a former dredge material disposal site. This area is a source of sedimentation into Old Cypress Embayment and maybe considered for potential dredge material placement for the proposed embayment restoration.



Old Cypress Riparian Habitat



Potential Dredge Material Site

Aquatic Habitats: The aquatic habitat within Old Cypress Embayment consists of seasonally flooded portions of the old creek channel. There appears to be little permanent water within the embayment. The aquatic portions of the site are narrow and shallow. Much of the water within the embayment is covered with duckweed (*Lemna sp.*) At the site near the mouth of the embayment a small creek branch/ditch enters the site that appears to be “septic” in nature.

The existing aquatic habitat at the site may provide seasonally available spawning and nursery habitat for Ohio River fishes. Little permanent aquatic habitat is present at the site.

Wetlands: Other than the bottomland hardwoods associated with the riparian zone, there are no jurisdictional wetlands present in the immediate vicinity of the proposed Old Cypress Slough Outlet/Embayment project area. These wetlands are limited to the tow of the banks along the bottom portions of the stream bank.



Mouth of Old Cypress Slough



Old Cypress site at Ohio River



Old Cypress Slough/Embayment



Old Cypress Slough/Embayment

Federally-Listed Threatened and Endangered Species: According to the U.S. Fish and Wildlife Service (USFWS), there are 11 federally-listed endangered species and 1 federally-listed threatened species known to occur in Posey County, Indiana. These species are listed on Table 1.

The riparian corridor adjacent to the Ohio River may provide summer roost habitat for the Indiana bat. Preferred tree species would include a mixture of oaks (*Quercus* spp.), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), and shagbark hickory (*Carya ovata*) (INHS, 1996). The riparian corridor may also provide feeding/foraging habitat for the Indiana bat.

Bald eagles may utilize forested areas for roosting/perching habitat and feed in the open water areas. It is unlikely that any eagle nests exist in the project area due to the urban nature of the site.

All of the mussels are freshwater species that typically inhabit medium to large river systems. The mussels are typically found in habitats with substrates that range from silt to gravel, and in

water depths from 0.5 to 8.0 meters. These species are generally associated with moderate to fast flowing water.

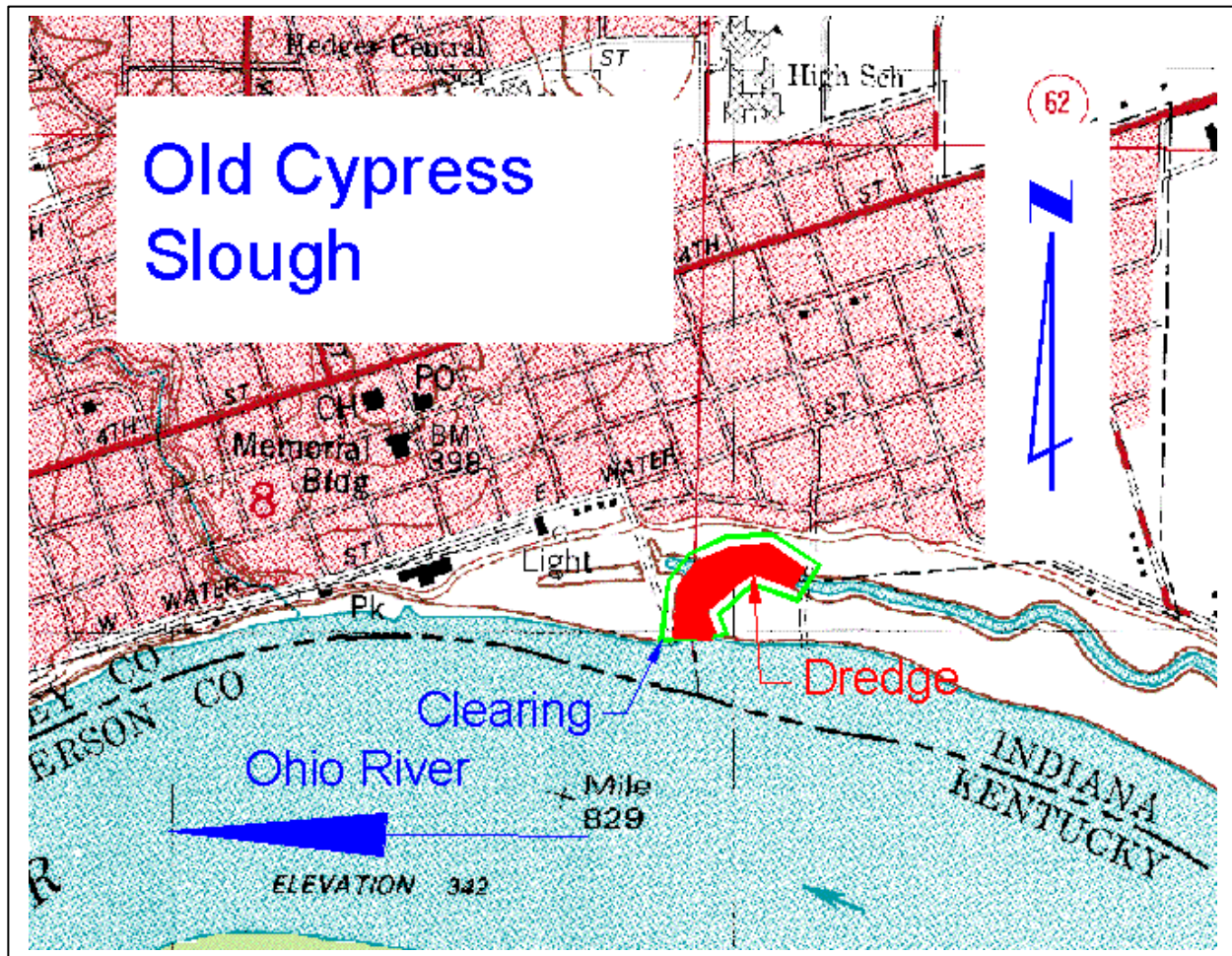
There does not appear to be suitable habitat for these species in the immediate vicinity of the project area. The American burying beetle is generally associated with upland habitats such as grassland prairie, forest edge, and shrubland. It is unlikely that the beetle would be found on the project area.

Table 1. Federally-listed species known to occur in Posey County, Indiana.

Common Name	Scientific Name	Federal Status	Potential Habitat Present
Indiana bat	<i>Myotis sodalis</i>	Endangered	Yes
Bald eagle	<i>Haliaeetus leucocephalis</i>	Threatened	Yes
Eastern fanshell pearly mussel	<i>Cyprogenia stegaria</i>	Endangered	No
Tubercled blossom mussel	<i>Epioblasma torulosa torulosa</i>	Endangered	No
Pink mucket pearly mussel	<i>Lampsilis abrupta</i>	Endangered	No
Ring pink mussel	<i>Obovaria retusa</i>	Endangered	No
White wartyback mussel	<i>Plethobasus cicatricosus</i>	Endangered	No
Orange-foot pimpleback mussel	<i>Plethobasus cooperianus</i>	Endangered	No
Clubshell mussel	<i>Pleurobema clava</i>	Endangered	No
Rough pigtoe mussel	<i>Pleurobema plenum</i>	Endangered	No
Fat pocketbook mussel	<i>Potamilus capax</i>	Endangered	No
American burying beetle	<i>Nicrophorus americanus</i>	Endangered	No

Source: U.S. Fish and Wildlife Service, 1999

4.0 Project Diagram



5.0 Engineering Design, Assumptions, and Requirements

5.1 Existing Ecological/Engineering Concern

The Old Cypress Slough embayment has filled with sediments due to several factors. These factors include: raised water levels from the impoundment of the Meyer's Pool; deposition of Ohio River silt-laden waters, especially during flood events; wave action from barge traffic; and headwater sediments from the Old Cypress Slough watershed.

5.2 Embayment Dredging

The dredging will be at a 3:1 slope resulting in an embayment approximately 4 acres in size with a new channel sloping from the shoreline to approximately 12 feet in depth along the centerline of the channel. A land-based dragline dredge will be used instead of the standard river hydraulic dredge system. Dredge spoil will be side cast onto the agricultural fields adjacent to the embayment. A total of 51,750 cubic yards of material would be removed from the existing channel.

5.3 Planning/Engineering Assumptions

- ◆ A 7 cubic yard dragline dredge would be used, and the material would be side cast directly on the adjacent agricultural fields.
- ◆ Bottom side slopes will be reshaped to a 3:1.
- ◆ No Finished grading of the banks would be done.
- ◆ The disturbed banks of the channel would be seeded

6.0 Cost Estimate (Construction)

Dredging – Engineering costs for the proposed project are contained in Table 2. A detailed MCACES cost estimate for the proposed project is included in Appendix C.

Table 2. Engineering Costs.	
Item	Cost
Clearing	\$5,400
Dredging	\$132,100
Reseeding	\$2,800
Mobilization	\$8,000
TOTAL	\$148,300

7.0 Schedule

Old Cypress Outlet/Embayment Dredging: The estimated construction time for this project is shown on Table 3.

Table 3. Construction Schedule.	
Item	Time
Clearing	2 Days
Dredging	92 Days
Reseeding	1 Day
Mobilization	4 Days
TOTAL	99 Days

8.0 Expected Ecological Benefits

Terrestrial/Riparian Habitats: The impacts of restoring/dredging the project area would primarily be in-stream. There would be no foreseeable beneficial impacts to terrestrial or riparian resources as a result of implementing the proposed project.

Aquatic Habitats: Long term beneficial impacts to aquatic resources would be expected as a result of implementing the proposed project. Dredging of the project areas would result in beneficial impacts to fishes due to the permanent aquatic habitat created as a result of deepening the embayment. The embayment could serve as feeding, nursery, high water refuge, or overwintering habitat for many riverine fish species.

Wetlands: There would be no reasonable foreseeable beneficial impacts to wetlands as a result of implementing the proposed project.

Federally-Listed Threatened and Endangered Species: There would be no reasonable foreseeable beneficial impacts to federally-listed threatened or endangered species as a result of implementing the proposed project.

Socioeconomic Resources: There would be minor short-term and long-term beneficial impacts to socioeconomic resources as a result of implementing the proposed project. The short-term beneficial impacts would be related to costs and local expenditures associated with the construction/dredging of the embayment. Long-term socioeconomic benefits would be realized through improved recreational fishing opportunities. Long-term indirect beneficial impacts will be realized through local expenditures for fishing tackle, food, gas, and other associated needs.

9.0 Potential Adverse Environmental Impacts

Terrestrial/Riparian Habitats: There would be long-term and short-term adverse impacts to the riparian lands adjacent to the embayment. Long-term impacts would occur due to the loss of terrestrial habitat that will be converted to aquatic habitat. Short-term impacts would also occur associated with the disposal of the dredge material on the adjacent lands. Adverse impacts to this area would be considered short term, because it is assumed that the site can be reused following the dewatering and grading of the dredge material. The disposal area has been previously disturbed and provides little habitat for terrestrial wildlife, consequently adverse impacts to terrestrial wildlife associated with dredge material disposal would be minimal and short term.

Aquatic Habitats: There would be potential short term adverse impacts to sensitive aquatic species as a result of implementing the proposed project. Aquatic species downstream from the project area could be impacted from increased water turbidity due to dredging operations.

Wetlands: There would be minimal foreseeable adverse impacts to jurisdictional wetlands as a result of implementing the proposed project. Jurisdictional wetlands within the project area appear to be limited to the tow of the stream banks. This riparian wetland type is expected to re-establish along the borders of the embayment once the proposed project has been completed.

Federally-Listed Threatened and Endangered Species: There would be potential for short-term adverse impacts to the bald eagle from construction related noise and disturbance. These impacts would be minor for the bald eagle, unless nesting areas are nearby, which could create the potential for nest abandonment. There would be no foreseeable adverse impacts to the Indiana bat as a result of implementing the proposed project. There would be a slight potential for adverse impacts to the endangered mussel species during the dredging of the project site. Mussels immediately downstream from the dredge site could be adversely impacted by perturbed water quality conditions associated with displaced sediments. There are no foreseeable adverse impacts to the American burying beetle as a result of implementing this project.

Socioeconomic Resources: There would be no reasonably foreseeable adverse socioeconomic impacts as a result of implementing the proposed project

10.0 Mitigation

Minor impacts associated with site restoration may occur during the construction of this project, however, no significant adverse impacts are expected. The use of best management practices and proper construction techniques would minimize adverse water quality impacts.

11.0 Preliminary Operation and Maintenance Costs:

Table 4. Operation and Maintenance Costs		
Maintenance	Frequency	Costs
Maintenance Dredging	25 years	\$ 11,000

12.0 Potential Cost Share Sponsor(s)

- ◆ Indiana Department of Natural Resources
- ◆ USDA-Natural Resources Conservation Service
- ◆ U.S. Fish and Wildlife Service
- ◆ U.S. Forest Service
- ◆ The Nature Conservancy
- ◆ Ducks Unlimited
- ◆ Local Government
- ◆ County Government
- ◆ Local Economic Development Council
- ◆ Indiana Bass Federation
- ◆ Local BASS chapters
- ◆ Private corporations
- ◆ Local marinas

13.0 Expected Life of the Project

It is anticipated that the dredging operation would provide meaningful depths for fishes in the embayment for approximately 25-30 years before additional dredging would be necessary.

14.0 Hazardous, Toxic, and Radiological Waste Considerations

Potential impacts of hazardous, toxic, and radiological waste (HTRW) at the site were visually assessed during a site visit.

Site Inspection Findings. The project site consists of an embayment/outlet in Posey County, Indiana near the town of Mount Vernon, Indiana at Ohio River mile 828.9.

The following environmental conditions were considered when conducting the June 28 and 30, 1999 project area inspection:

- | | |
|--------------------------------------|-----------------------------|
| ◆ Suspicious/Unusual Odors; | ◆ Impoundments/Lagoons; |
| ◆ Discolored Soil; | ◆ Drum/Container Storage; |
| ◆ Distressed Vegetation; | ◆ Electrical Transformers; |
| ◆ Dirt/Debris Mounds; | ◆ Standpipes/Vent pipes; |
| ◆ Ground Depressions; | ◆ Surface Water Discharges; |
| ◆ Oil Staining; | ◆ Power or Pipelines; |
| ◆ Above Ground Storage Tanks (ASTs); | ◆ Mining/Logging; and |
| ◆ Underground Storage Tanks (USTs); | ◆ Other. |
| ◆ Landfills/Wastepiles; | |

A field and disposal site was observed to the east of the site, and a parking area with an associated boat ramp is to the west. A small branch to the west of the embayment appears to carry a sewage load. There is urban trash in the shoreline area. Long term sewage loading to the shallow embayment and runoff from the city of Mount Vernon, Indiana has the potential to

result in sediment contamination in the embayment. None of the other environmental conditions listed above were observed on the project site.

15.0 Property Ownership & River Access

Selected data on properties immediately adjacent to or within each concept site was collected from the county courthouse of the respective county of each site. Data collected included map and parcel identification number, property owner's name and mailing address, acreage of the potentially affected parcel, and market value of the parcel. This procedure involved obtaining a plat or parcel map of the site and surrounding area which identified each parcel with a corresponding map and parcel number. The map\parcel identification number was subsequently used to determine the property owner's name and mailing address from records in the County Assessor's or County Auditor's office. Plat\parcel maps were collected for each site. The market value of each parcel as contained in the property tables reflects the assessed valuation to supposedly market value ratio used in each State for taxation purposes. These assessed values reflect 1998 assessments. The assessed valuation ratio is 33.3 percent for Indiana.

The above ratios were used to approximate the market value of each property. However, in many instances the resultant market value calculated under the above procedure is considerably below the actual value of the land in the real market. Local real estate brokers could provide a more accurate estimate of actual land values.

The collected property data indicate that public lands are adjacent to the Old Cypress Slough Outlet/Embayment project area. No private lands will be needed or disturbed for this project. The disposal of dredge material will be on state owned property.

Table 5. Property Characteristics				
Site Name: Old Cypress Slough Outlet and Embayment				
Location: Posey County, Indiana				
Map/Parcel Number	Owner	Mailing Address	Market Value	Acreage
523/07	State of Indiana	(assume this is the Indiana Dept. of Natural Resources)		85.00
523/08	State of Indiana	(same)		7.27
523/08-01	State of Indiana	(same)		10.73
523/09	State of Indiana	(same)		10.53
* Denotes improvements on property.				

16.0 References

Scott, 1989	Scott, M.T. and L.A. Nielson. 1989. Young fish distribution in backwaters and main-channel borders of the Kanawha River, West Virginia. <i>Journal of Fisheries Biology</i> No. 35 (Supplement A) pp. 21-27.
Sheaffer, 1986	Sheaffer, W.A. and J.G. Nickum. 1986. Backwater areas as nursery habitats for fishes in Pool 13 of the Upper Mississippi River. <i>Hydrobiology</i> No. 136 pp. 131-140.
Sheehan, 1994	Sheehan, R.J., W.M. Lewis, and L.R. Bodensteiner. 1994. Winter habitat requirements and overwintering of riverine fishes. Fisheries Research Laboratory, Southern Illinois University, Carbondale, Illinois. Final Report F-79-R-6.

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USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Northern States Bald Eagle Recovery Plan. USFWS Denver, Colorado
USFWS, 1983	U.S. Fish and Wildlife Service, 1983. Recovery Plan for the Indiana bat (<i>Myotis sodalis</i>).
USFWS, 1984	U.S. Fish and Wildlife Service, 1984. Recovery Plan for the Orange-footed Pearly Mussel, <i>Plethobasus cooperianus</i> . Prepared by S. Ahlstedt for USFWS Region 4 August 30, 1984. 46pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1985. Recovery Plan for the Tubercled-blossom Pearly Mussel, <i>Epioblasma torulosa torulosa</i> , Turgid-blossom Pearly Mussel, <i>Epioblasma turgidula</i> , Yellow-blossom Pearly Mussel, <i>Epioblasma florentina florentina</i> . USFWS Atlanta, Georgia. 42pp.
USFWS, 1985	U.S. Fish and Wildlife Service, 1996. Recovery plan for the pink mucket pearly mussel. USFWS Atlanta, Georgia.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Recovery Plan for Ring Pink Mussel (<i>Obovaria retusa</i>). Prepared by R.G. Biggins for the Southeast Region USFWS February, 1991. 24pp.
USFWS, 1991	U.S. Fish and Wildlife Service, 1991. Fanshell Recovery Plan. Prepared by R.G. Biggins for the Southeast Region USFWS July 9, 1991. 37pp.
USFWS, 1994	Recovery Plan for the Clubshell (<i>Pleurobema clava</i>), Northern Riffleshell (<i>Epioblasma torulosa rangiana</i>). Prepared by G.T. Watters for USFWS Region 5, Hadley, Massachusetts. 57pp.
USFWS, 1997	U.S. Fish and Wildlife Service, 1997. Species Accounts: pink mucket pearly mussel (<i>Lampsilis abrupta</i>).
USFWS, 1999	U.S. Fish and Wildlife Service, July 1, 1999. Federally Listed Endangered and Threatened Species in Indiana.

APPENDIX A Threatened & Endangered Species

APPENDIX B Plan Formulation and Incremental Analysis Checklist**Project Site Location:**

The proposed Old Cypress Slough Outlet/Embayment Restoration project is located in Posey County, Indiana along the southeastern edge of Mt. Vernon, Indiana. The project area is near the Ohio River Meyer's Pool at river mile 828.9. The project site is within the jurisdiction of the Louisville District, U.S. Army Corps of Engineers (USACE).

Description of Plan selected:

The primary goals of the Old Cypress Slough Outlet/Embayment Restoration project include restoration of the existing embayment to enhance fish and wildlife habitat. The restoration of backwater areas will provide reproductive, feeding, nursery, high water refuge, seasonal migration, and overwintering habitat for many fish species. The project involves dredging 50% of the surface area to an average depth of 12 feet at the USACE normal pool level. The restoration of Old Cypress Slough Outlet/Embayment will result in improved off channel habitat within the Myers Pool of the Ohio River.

Alternatives of the Selected Plan:

Smaller Size Plans Possible? **Yes** and description

Reduce the amount of dredging.

Larger Size Plan Possible? **Yes** and description

Increase the amount of dredging.

Other alternatives? No

Restore/Enhance/Protect Terrestrial Habitats? ☐ No **Objective numbers met** ☐

Restore, Enhance, & Protect Wetlands? ☐ No **Objective numbers met** ☐

Restore/Enhance/Protect Aquatic Habitats? ☒ Yes **Objective numbers met** ☒ A1

Type species benefited: Variety of Ohio river fish species

Endangered species benefited: None

Can estimated amount of habitat units be determined: Approximately 4 acres of embayment will be created/restored.

Plan acceptable to Resources Agencies?

U.S. Fish & Wildlife Service?

State Department of Natural Resources? Yes – Indiana DNR

Plan considered complete? Connected to other plans for restoration?

Real Estate owned by State Agency? Yes Federal Agency? No

Real Estate privately owned? No

If privately owned, what is status of future acquisition Not required

Does this plan contribute significantly to the ecosystem structure or function requiring restoration? What goal or values does it meet in the Ecosystem Restoration Plan?

Restoration provides habitat diversity, spawning habitat, nursery habitat, over-wintering habitat, and winter velocity shelters for fishes.

Is this restoration plan a part of restoration projects planned by other agencies? (i.e. North American Waterfowl Management Plan, etc.)

No

In agencies opinion is the plan the most cost effective plan that can be implemented at this location?

Can this plan be implemented more cost effectively by another agency or institution?

Yes / No

Who:

From an incremental cost basis are there any features in this plan that would make the project more expensive than a typical project of the same nature? For embayment type plans is there excessive haul distance to disposal site? More expensive type disposal? Spoil that requires special handling/disposal?

Potential Project Sponsor:

Government Entity: _____

Non-government Entity _____

Corps Contractor _____ Date _____

U.S. Fish & Wildlife Representative _____ Date _____

State Agency Representative _____ Date _____

U.S. Army Corps of Engineers Representative _____ Date _____

Terrestrial Habitat Objectives

- T1 Riparian Corridors
- T2 Islands
- T3 Floodplains
- T4 Other unique habitats (canebrakes, river bluffs, etc.)

Wetland Habitat Objectives

- W1 Forested Wetlands: Bottomland Hardwoods
- W2 Forested Wetlands: Cypress/Tupelo Swamps and other unique forested wetlands
- W3 Scrub/Shrub Emergent Wetlands: isolated from the river except during high water and contiguous (includes scrub/shrub wetlands in embayments and island sloughs)

Aquatic Habitat Objectives

- A1 Backwaters (sloughs, embayments, oxbows, bayous, etc.)
- A2 Riverine submerged and aquatic vegetation
- A3 Sand and gravel bars
- A4 Riffles/Runs (tailwaters)
- A5 Pools (deep water, slow velocity, soft substrate)
- A6 Side Channel/Back Channel Habitat
- A7 Fish Passage
- A8 Riparian Enhancement/Protection

APPENDIX C Micro Computer-Aided Cost Engineering System (MCACES)